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SCIENCE

NEW YORK, MARCH 27, 1891.

THE OYSTER QUESTION.¹

I HAVE been asked to say a few words on the relation of scientific investigation to the great question of the preservation of the Maryland oyster. It is Professor Brooks who ought now to be addressing you, for it is chiefly concerning his work that I shall have to speak. It is nearly all of it his work; but he would not have said this himself, and for that reason, at least, I am glad to stand in his shoes to-day. It is a simple tale I have to tell. If at its close I try to point a moral, you will kindly hold me alone responsible for what I may say. No other person has at the present moment an inkling of what it is to be.

In 1879 there appeared a modest pamphlet, No. 1, of the "Studies from the Biological Laboratory of the Johns Hopkins University." Among other papers, it included one by Professor Brooks, on the development from the egg of a small animal, which, details apart, I may designate as a third or fourth or Virginian cousin of the oyster: at any rate, it and the oyster belong to the same great molluscan group of animals. This work was done in 1878. It was followed next year by a treatise on the development of some fresh-water *Mollusca*; and during the same year another member of the university endeavored, at the instigation of the Fish Commission, to discover the very youngest oysters, and learn their mode of life; to find how they grew, what they needed, and what they did, what they thrived on, and what was apt to injure them until they settled down on the bottom of our bay to fatten for Baltimore palates.

This first effort was a failure, in consequence of too great reliance upon the natural history of the oyster of the effete monarchies of the Old World. The oyster of Europe is a molly-coddled youngster, living inside his mamma's shell until he has a shell of his own. Seeking the young American oyster between the shells of its mother, Professor Rice failed to find it, as others had failed before. In the early spring of 1879, Major Ferguson, then fish commissioner of Maryland, made another appeal to Professor Brooks, and offered him aid not only from the State, but from the National Fish Commission, in order that he might study the development and life-history of the oyster. For such a study his work on the early development of other *Mollusca* had fitted him. The university trustees gave him leave of absence more than a month before the beginning of the regular holiday. Some of his colleagues assumed responsibility for due performance of the regular academic work. He went to Crisfield, where he was later in the season joined by other members of the biological department of the university.

Within twenty-four hours of the arrival of Dr. Brooks at Crisfield, two facts of fundamental importance were discovered by him, — one that the American oyster is not nursed within the shell of the parent, but, like all young Americans, shows an early independence; the other, that it was possible to take their eggs from oysters, and fertilize and rear them artificially, just as shad and trout are bred in our great fish-cultural stations on the Susquehanna and elsewhere. These two discoveries, based on previous investigation of the development of mollusks which had no commercial importance, made a new starting-point for the study of the oyster. It was impossible to catch and study in continuous development the microscopic, embryonic oyster scattered throughout the Chesapeake Bay; but once we could hatch out the oyster in the laboratory, and study its growth and life conditions, a very important step forward would be made. It was proved that we

could get young oysters in incalculable numbers at a very small cost; and, far more important, an opportunity to investigate the life conditions of the young oyster would be given. To carry on the growth of the artificially hatched young oysters, a steady supply of fresh sea-water was needed. This the university provided the next year by the purchase of a small steam-engine and a complete outfit for the breeding of young oysters on a small scale. The privations endured by the morphologists of the biological laboratory in the endeavor to find out the whole life-history of the Chesapeake oyster at every stage of its growth, to find its enemies, and how to meet and beat them, were not inconsiderable. Being cast adrift on a barge on the bay during a storm was but one of their anxieties.

The seaside laboratory of the Johns Hopkins University maintained its station at Crisfield until early in July; then the men had to leave. Biologists are human, and the Crisfield mosquito is inhuman; and some rather extravagant persons assert, that, should the present state of affairs continue, the average Crisfield oyster will soon be no larger than the average Crisfield mosquito. But before the party left, they had established the two leading facts, — that the eggs of the Maryland oyster are thrown out into the bay to be fertilized at random, and that it was possible to fertilize and hatch thousands of them in a watch-glass; in fact, that in a few buckets of sea-water one could hatch enough eggs to supply spat for the whole Chesapeake Bay.

And what does that bay mean? Honestly and intelligently managed, it means untold wealth for our State. The people of Maryland have a richer heritage than the coal-fields of Pennsylvania or the silver mountains of Colorado. The two latter may, they must, become exhausted as time goes on; while, with some little wise and faithful care, the Chesapeake will bring, year after year, millions of dollars to Maryland citizens. This may seem an extravagant statement; but, if you will consider the facts, you will find that it is but sober truth.

Have you any notion of the wealth that is carried down to the Chesapeake by the rivers that flow into it? You have seen our oyster soiled by black mud, which surrounds its shells. Did you ever think what that mud meant? It is the nesting-place of the food of the oyster. This food consists of tiny plants, which find nourishment in the mud, and multiply with inconceivable rapidity.

How the oyster feeds may seem a problem. Fixed to an anchorage, how does it get its food? As seen on the "raw box," which is always "now open," the oyster is shut as close as a clam; but in its native habitat its shells are always a little apart, and microscopic waving hairs set up currents which carry the food-plants to its mouth, where they are engulfed and afterwards digested. The oyster feeds every hour, every minute, of the day, and turns material otherwise unavailable into one of the best of human foods. Scientific work by the State and national surveys has proved that nearly three-quarters of the bay are covered by such mud, and are fitted to nourish oysters, though only a small part is oyster-bed. Why? The embryo sinks in the mud, and is smothered. To thrive, it needs merely some stones or other solid objects to serve as a resting-place.

It might seem that an increase of oysters would exhaust this supply of mud food, as the cattle of our Western ranges exhaust the bunch-grass; but the supply is inexhaustible. This mud swarms with the germs of little plants, which swim through the water, and are taken in by the oyster. It is impossible to exhaust the food-supply of the oyster; and you do not have to provide it, like the Kansas farmer, who has to grow corn and turn it into pork.

We have, then, two questions confronting us, — the preservation of our existing oyster-beds, and the making of new ones. For

¹ Address by Dr. H. Newell Martin, professor of biology, at the fifteenth anniversary of the Johns Hopkins University, Feb. 28, 1891.

the making of new oyster-beds, legislation is necessary, in order that citizens may spend the money necessary to prepare and sow them, and that they may feel sure that their investment shall be protected from theft. As to protection from theft, I am informed, on what I believe to be good authority, that a private oyster-bed, made in accordance with full provisions of the law, was robbed of 340,000 bushels of oysters last season, with no effective interference from the oyster navy.

This navy, what is it? and our laws, what are they?

Let me tell you a short story, but a true one, — a story of an oyster-steamer with some scientific students on board. On every side dredgers were violating the law. About dark each day the captain felt sufficiently braced up to make an arrest: he made for the nearest oyster-sloop, quite sure that it was breaking the law; and, as every oyster-sloop does violate the law, the captain was safe in going for the nearest. The commander of the pirate was arrested and taken before a justice of the peace, who had his office near the place of arrest. The magistrate, more likely than not a shareholder in the oyster-stealing sloop, was asked to wait until the accused person could bring his witnesses. The outraged captain answered that he could not waste the time of his scientific friends, and he therefore withdrew the charge, that they might not suffer; and this sort of thing went on day after day.

Is not this oyster navy, on the whole, a fraud, or perhaps rather a sham, — the scoff of the oyster thieves and the scorn of the whole State? Perhaps not so bad as it used to be, but even now a public scandal.

Some friends wish the university to undertake the breeding of oysters. That is purely a commercial matter, and should be done by business-men. The engagement of the proper man as manager, the hiring of laborers, the purchase of machinery, — all that is a business matter, and not university work at all.

They say, "We want to get the oyster out of politics." The university cannot take it out, though the oyster might get the university into politics, which may a merciful Providence forever forefend! You cannot get the oyster out of politics, and it would not be right to do it if you could. As oyster-catching is a chief industry of the State, the oyster question must always be a political question. The one thing necessary is to make our politicians as good as our oysters.

The fact remains that the Maryland oyster is becoming extinct. To preserve it, to maintain our heritage, needs some little honest and intelligent legislation, needs some active, instructed, and well-meaning control. Will you see to it?

RECENT ADVANCES IN MEDICINE.¹

EMANCIPATED from the thralldom of authority in which it was fast bound for centuries, medicine has progressed with extraordinary rapidity, and even within the present generation has undergone a complete revolution. The advance has been in three directions: first, in the prevention of disease. A study of the conditions under which epidemics develop has led to the important work of sanitary science. For fifty years the watchword of the profession in this matter has been cleanliness; and clean streets, good drains, and pure water have in many towns reduced the mortality from certain diseases fifty per cent. In this department certainly medicine has achieved its greatest victories. It is a thought full of encouragement to know that such diseases as typhoid-fever and diphtheria may ultimately be stamped out, and be as rare among us as leprosy and small-pox. In this work the profession requires, and can often obtain, the intelligent co-operation of city authorities and the public. People scarcely understand how much has already been done, nor do they yet fully appreciate the possibilities of preventive medicine.

The second great advance which medicine has made relates to the knowledge which has been gained of the agents producing diseases. Dating from the studies on fermentation by Pasteur, and the early work of Lister, we have gradually learned to recognize the importance of the structures known as bacteria, which has revolutionized the practice of surgery and gynecology. To-

day surgery is a new art, and hundreds now recover after operations from which hundreds previously died. The information which we now have on these subjects has been slowly and painfully acquired, here a little and there a little; but the outcome of it all is that as clean streets and good drains and pure water mean municipal health, so absolute cleanliness and absence of contamination mean in great part freedom from infection. So universally present are the infective agents, particularly of suppuration, that it is only by the most scrupulous care that the infection of wounds can be prevented; and it is now generally acknowledged that the highest type of this antisepticism is obtained, not by the use of various solutions which destroy the germs, but by such measures of cleanliness as effectually prevent the possibility of their presence. Now, the point for the public to appreciate in this whole question is that they are reaping the benefit of advances rendered possible by work done in laboratories without a thought of its application to life-saving.

The researches showing the relation of special microscopic organisms to special diseases are likely to lead to the most important results. The cultivation of the germs of disease outside of the body has enabled us to study the products of their growth, and in several instances from them to obtain materials which, when injected into an animal, act as a sort of vaccine against the disease itself. The hope of obtaining in some of the most important diseases vaccines which will bear the same relation to them as ordinary vaccine to small-pox is very reasonable, and likely ere long to be realized. In another direction, too, the recent studies of Koch have shown that in the growth of these bacilli materials are obtained which may act most powerfully upon the body, and attack the elements of the disease itself. His discovery of the action of the product of the growth of the tubercle bacilli upon tuberculous tissue ranks as one of the most remarkable of late years. His claims that this will cure early tuberculosis and lupus will, I believe, be substantiated. Great as is this fact in itself, the possibilities which it opens up to our view are still greater, and it may be safely said, that, apart altogether from the action of the lymph, no more encouraging discovery has been made in the past twenty-five years.

But I hear the householder say, "All that is very well; but Tommy gets the measles, and Mary has the mumps, and Susie gets the whooping-cough, just as my grandmother tells me her children had fifty years ago. My doctor's bills are possibly a little larger than were father's, and I know his drug bill could not have been as heavy as was mine for the last quarter." This may be perfectly true, for the millennium has not yet come; but it is perfectly true that to-day Mrs. Householder's risks have been reduced to a minimum in the necessary domestic emergencies, and her children's chances of reaching maturity have been enormously enhanced.

The third great advance has been the diffusion in the profession and among the public of the more rational ideas upon the treatment of disease. Dieting and nursing have supplanted in great part bleeding and physicking. We know now that a majority of febrile affections run a definite course, uninfluenced by drugs. We recognize daily the great fact that disease is only a modification of the normal processes of health, and that there is a natural tendency to recover. We cannot claim in the medicinal treatment of disease to have made great positive advances; still, to have learned not to do what we did is for the poor patients a great gain. The past half-century has placed only half a dozen absolutely indispensable drugs which must be used by all indiscriminately who practise the healing art.

A desire to take medicine is, perhaps, the great feature which distinguishes man from other animals. Why this appetite should have developed, how it could have grown to its present dimensions, what it will ultimately reach, are interesting problems in psychology. Of one thing I must complain, — that when we of the profession have gradually emancipated ourselves from a routine administration of nauseous mixtures on every possible occasion, and when we are able to say, without fear of dismissal, that a little more exercise, a little less food, and a little less tobacco and alcohol, may possibly meet the indications of the case — I say it is a just cause of complaint that when we, the priests, have

¹ Address by Dr. William Osler, professor of medicine, at the fifteenth anniversary of the Johns Hopkins University, Feb. 23, 1891.